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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/634,867  | 08/06/2003  | Hyang-Shik Kong      | 6192.0157.D1        | 7649             |
| 7590  | 09/23/2004  |                      | EXAMINER            |                  |
| McGuireWoods LLP<br>Suite 1800<br>1750 Tysons Boulevard<br>McLean, VA 22102 |             |                      | DUONG, KHANH B      |                  |
|   |             |                      | ART UNIT            | PAPER NUMBER     |
|   |             |                      | 2822                |                  |

DATE MAILED: 09/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/634,867

Applicant(s)

KONG ET AL.

Examiner

Khanh Duong

Art Unit

2822

*Am*

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,4-7,13,16-22 and 24-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 4-7, 13, 16-22 and 24-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

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## **DETAILED ACTION**

### ***Response to Amendment***

This Office Action is in response to the Amendment filed on July 1, 2004.

Accordingly, claims 2, 3, 14, 15 and 23 were cancelled, and claims 1, 4-6, 13, 16-22 and 24-33 were amended.

Currently, claims 1, 4-7, 13, 16-22 and 24-33 are pending in the application.

### ***Response to Arguments***

Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Objections***

Claim 1 is objected to because of the following informalities: line 6, after "extending", "though" should be --through--. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

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4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 1, 4-7, 13, 18-22 and 26-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al. (US 6,287,899) in view of Fogarty et al. (US 4,181,564).**

Park et al. ("Park"), cited in previous Office Action, discloses in FIGs. 3-5, 13 and 15 a method for manufacturing a thin film transistor array panel, comprising steps of: forming a gate wire formed of an aluminum-based material on a substrate, the gate wire comprising a gate line 22, a gate electrode 26 and a gate pad 24; depositing a silicon nitride layer to form a gate insulating layer 30; forming a semiconductor layer 42 on the gate insulating layer 30; forming a data wire including a data line 62, a source electrode 65 and a drain electrode 66; forming a passivation layer 70 over the gate insulating layer 30 and the data wire; forming a contact hole 74 extending through the passivation layer 70 and the gate insulating layer 30 and exposing the gate pad 24; depositing an IZO layer over the passivation layer; and patterning the IZO layer to form a redundant gate pad 84 connected to the gate pad 24 through the contact hole 74 [see col. 9, ln. 36-41, 66 and 67; col. 10, ln. 38-45; col. 16, ln. 3-5].

Re claims 1, 4, 13, 19 and 22, Park fails to disclose the deposition conditions for the silicon nitride insulating layer at a temperature in the range of 280-400°C for a period in the range of 5-40 minutes.

Fogarty et al. ("Fogarty") suggests forming a silicon nitride layer at a temperature in the range of 270-375°C for a period in the range of about 45 minutes [see col. 2, ln. 65 to col. 3, ln. 3 and col. 4, ln. 35-55].

Since Park and Fogarty are both from the same field of endeavor, the purpose disclosed by Fogarty would have been recognized in the pertinent prior art of Park.

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It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Park as suggested by Fogarty, since Fogarty states at column 4, lines 26-29 such modification would provide a silicon nitride layer having an essentially constant Si/N ratio throughout the thickness of the layer.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a temperature and time within the ranges as taught by Fogarty, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Re claims 5, Park fails to disclose the contact hole is more than 0.5 mm x 15  $\mu\text{m}$  and less than 2 mm x 60  $\mu\text{m}$ .

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select the size of the contact hole within the range as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Re claims 6 and 7, since the contact structure of the wire of Park et al. are formed of the same materials as the claimed invention, it should be inherent that a contact resistance between the aluminum-based material and the IZO is less than 10% of a wire resistance of the wire or less than 0.15  $\mu\Omega\text{cm}^2$ .

Re claim 18, Park expressly discloses in FIG. 5 the step of patterning the IZO layer 84 comprises a step of: forming a pixel electrode 87 connected to the data wire 66.

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Re claim 20, Park expressly discloses in FIG. 3 patterning the IZO layer comprises a step of forming a pixel electrode 87.

Re claim 21, Park expressly discloses in FIG. 4 the data wire further comprises a data pad 64, and the step of patterning the IZO layer comprises a step of forming a redundant data pad 86 connected to the data pad 64.

Re claims 26-33, Park expressly discloses in FIGs. 31B-33: data wire 60 and the semiconductor layer 40 are simultaneously patterned by a photoresist pattern 100 having portions with different thicknesses, wherein the photoresist pattern 100 comprises a first portion having a first thickness, a second portion having a second thickness greater than the first thickness, and a third portion having a third thickness smaller than the first thickness; a mask 200 being used for forming the photoresist pattern 100 has a first area having a first transmittance, a second area having a second transmittance smaller than the first transmittance, and a third area having a third transmittance greater than the first transmittance; the first portion of the photoresist pattern 100 is aligned on a portion between the source electrode 65 and the drain electrode 66, and the second portion of the photoresist pattern is aligned on the data wire 60; the first area of the mask 200 includes a partially transparent layer, or a pattern reducing a transmittance; depositing an ohmic contact layer 50 between the data wire 60 and the semiconductor layer 40, wherein the data wire 60, the ohmic contact layer 50, and the semiconductor layer 40 are patterned by a single photolithography process.

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**Claims 16, 17, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park and Fogarty as applied to claims 1, 4-7, 13, 18-22 and 26-33 above, and further in view of Arai et al. (US 6,399,222).**

Re claims 16, 17, 24 and 25, Park and Fogarty fail to disclose the indium zinc oxide is formed by sputtering target including  $\text{In}_2\text{O}_3$  and  $\text{ZnO}$ , wherein the content of Zn in a compound of  $\text{In}_2\text{O}_3$  and  $\text{ZnO}$  is in the range of 15-20%.

Arai et al. ("Arai") suggests the indium zinc oxide is preferably formed by sputtering target including  $\text{In}_2\text{O}_3$  and  $\text{ZnO}$ , wherein the content of Zn in a compound of  $\text{In}_2\text{O}_3$  and  $\text{ZnO}$  is in the range of 1-20% [see col. 4, ln. 22-32].

Since Park and Arai are both from the same field of endeavor, the purpose disclosed by Arai would have been recognized in the pertinent prior art of Park.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Park as suggested by Arai, since Arai states at column 4, lines 47-49 that such modification would provide an electrode layer having a sufficient thickness.

Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select the content of Zn in a compound of  $\text{In}_2\text{O}_3$  and  $\text{ZnO}$  within the range as taught by Arai, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

#### ***Response to Arguments***

Applicant's arguments filed July 1, 2004 have been fully considered but they are not persuasive.

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Applicant argues that Park and Fogarty are directed to two different fields of endeavor, and the purpose disclosed by Fogarty would not have been recognized in the pertinent prior art of Park. In response, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, both Park and Fogarty are directed to same field of semiconductor and are particularly pertinent to the problem of forming a silicon nitride layer at certain process parameters, namely temperature and time.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, as previously discussed, Fogarty cures the deficiency of Park by suggesting to form a silicon nitride layer at a temperature in the range of 270-375°C for a period in the range of about 45 minutes [see col. 2, ln. 65 to col. 3, ln. 3 and col. 4, ln. 35-55].

Applicant states through out the REMARKS that claims 3, 14, 15 and 22 were indicated in the previous Office Action as being allowable over Park. After a careful review of the previous Office Action, the Examiner has not been able to find any indication that supports Applicant's such statement.



***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

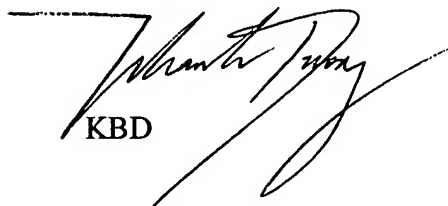
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Duong whose telephone number is (571) 272-1836. The examiner can normally be reached on Monday - Thursday (9:00 AM - 6:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



KBD



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